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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH ADMINISTRATION
BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY

LIST OF PUBLICATIONS AND PATENTS
of the
Northern Regional Research Laboratory
Peoria, Illinois

July - December 1951

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PUBLICATIONS

ANALYSIS OF FAT ACID OXIDATION PRODUCTS BY COUNTERCURRENT DISTRIBUTION METHODS. III. METHYL LINOLENATE.

J. Fugger, J. A. Cannon, K. T. Zilch, and H. J. Dutton.
Jour. Amer. Oil Chem. Soc. 28(7): 285-289. July 1951.

Methyl linolenate, oxidized at low temperature to levels between 0.1 and 1.1 moles oxygen per mole ester, has been fractionated by countercurrent distribution techniques. Separation of oxidized products containing diene conjugation from those showing triene conjugation has been effected and these materials have been characterized by chemical analysis. Dimerization occurred during the oxidation process or immediately thereafter. Monomeric monohydroperoxide was not present in any appreciable quantity.

DENATURATION OF SOYBEAN PROTEIN WITH ALCOHOLS AND WITH ACETONE.

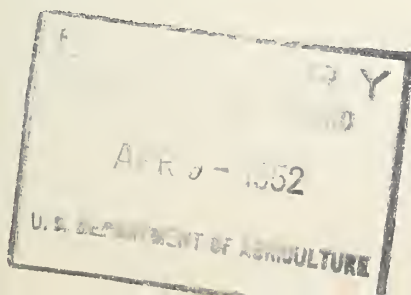
A. K. Smith, V. L. Johnsen, and R. E. Derges.
Cereal Chem. 28(4): 325-333. July 1951.

The denaturation of the protein in soybean meal by various concentrations of methanol, ethanol, isopropanol, and acetone has been investigated in the temperature range of 30° to 75°C. and for various time intervals. Denaturation was measured by the change in water dispersibility of the protein. The alcohol-water solutions, at 40 to 60 percent concentration, are the most effective. The denaturation reaction is nearly complete in 5 minutes.

DRYING OILS FROM XYLITOL.

H. M. Teeter, E. W. Bell, and J. C. Cowan.
Jour. Amer. Oil Chem. Soc. 28(7): 299-300. July 1951.

To evaluate soybean fat acid esters for use in paints, esters of xylitol with linseed and soybean fat acids prepared. They showed objectionable thixotropy and crawling, but the drying properties were superior to those of soybean oil. An average of one hydroxyl group per molecule of xylitol was lost by dehydration during esterification.



METHYLATION AND ETHYLATION OF CORN STARCH, AMYLOSE AND AMYLOPECTIN IN LIQUID AMMONIA.

J. E. Hodge, S. A. Karjala, and G. E. Hilbert.

Jour. Amer. Chem. Soc. 73(7): 3312-3316. July 1951.

To obtain completely methylated cornstarch fractions without severe degradation of the polyglucose chains, the authors adapted Freudenberg's liquid ammonia procedure. The cause of the degradation produced by Freudenberg's method was established and a way of avoiding it was found. Trimethyl ethers of cornstarch, amylose, and amylopectin of high intrinsic viscosity were prepared. Contrary to the findings of Freudenberg and Boppel, trimethyl amylose is distinctly different from trimethyl amylopectin. Trimethyl cornstarch was fractionated into methyl amylose (25 percent) and methyl amylopectin (75 percent) by means of their different solubilities in Diethyl "Cellosolve." Triethyl ethers of cornstarch, amylose, and amylopectin were prepared for the first time. The disorganizing effect of liquid ammonia on starch granules was used to prepare dry granular starches dispersible in water. Use of this ammonia-treated starch allowed the omission of autoclaving in the starch fractionation procedure of Schoch.

STUDIES ON THE RELATION OF BRAN THICKNESS TO MILLABILITY OF SOME PACIFIC NORTHWEST WHEATS.

R. A. Larkin, M. M. MacMasters, M. J. Wolf, and C. E. Rist.

Cereal Chem. 28(4): 247-258. July 1951.

Seven varieties of wheat from the Pacific Northwest were examined microscopically for thickness of bran layers, viz., outer pericarp, cross and tube cell layer, spermoderm, nucellar layer, and aleurone layer, in an effort to obtain data that might be correlated with the general milling behavior of the wheats. While there were differences in thickness of the bran layers among the seven varieties, these differences were not directly related to the general milling behavior of the wheat varieties studied. Less difference in thickness of adjacent aleurone cells was found in good-milling than in poor-milling varieties. There was no conclusive evidence, however, that this is a major factor affecting milling quality.

UTILIZATION OF FUNGAL AMYLASE FOR ALCOHOL PRODUCTION.

Julian Coman and Henry M. Tsuchiya.

Cereal Chem. 28(4): 280-288. July 1951.

This study confirms previous findings that the alcohol yield from grain mashes converted with fungal amylase correlate with the maltase content of the latter. However, this correlation exists only if an adequate amount of alpha-amylase is also present. The addition of small amounts of barley malt to fungal amylase containing moderate amounts of alpha-amylase and maltase did not spare the amount of fungal amylase required for satisfactory conversion of grain mashes. However, the addition of small amounts of malt to fungal amylase high in maltase, but low in alpha-amylase, lowered substantially the requirement of fungal amylase.

FRACTIONATION OF LINSEED PHOSPHATIDES.

T. A. McGuire and F. R. Earle.

Jour. Amer. Oil Chem. Soc. 28(8): 328-331. August 1951.

Alcohol-soluble and alcohol-insoluble fractions of linseed phosphatides were subjected to countercurrent distribution in the Craig apparatus. The soluble portion, which was shown by analysis to contain essentially all of the choline and very little of the inositol, gave little further fractionation on distribution between hexane and 90 percent methanol. Distribution of the alcohol-insoluble phosphatides between hexane and 90 percent ethanol showed two types of phosphoinositides to be present. Those concentrated in the alcohol phase had a phosphorus:nitrogen:inositol ratio of approximately 2:1:1, whereas those more soluble in hexane had a ratio of approximately 4:4:1. Analysis for "ethanolamine" by the periodate method failed to show as much amino nitrogen as analysis by the Van Slyke method. This difference, considered with the shape of the ethanolamine nitrogen curves, prevents a satisfactory calculation of the amount of cephalin. Sugar occurs also in all fractions, but its mode of combination, if any, was not demonstrated.

THE SOLUBILITY OF PROPANE AND THE BUTANES IN ETHANOL.

Carl B. Kretschmer and Richard Wiebe.

Jour. Amer. Chem. Soc. 73(8): 3778-3781. August 1951.

The solubility of propane, *n*-butane, and isobutane in ethanol was measured at temperatures between 0° and 50° and at pressures up to one atmosphere. The second virial coefficients of these gases were measured at 30°. A semi-empirical equation was fitted to the solubilities, which are reported as mole fraction of hydrocarbon at a given total pressure. The partial molal excess free energy and entropy and the partial molal heat of mixing of the hydrocarbons at infinite dilution were calculated from the data. The solutions exhibit large positive deviations from Raoult's law, and the excess partial molal entropies are negative.

SPECTROCHEMICAL DETERMINATION OF IRON AND COPPER IN COMMERCIAL OILS.

E. H. Melvin and J. E. Hawley.

Jour. Amer. Oil Chem. Soc. 28(8): 346-347. August 1951.

A spectrochemical method with improved sensitivity necessary for the determination of iron and copper in oils has been developed. Amounts as low as 0.01 p.p.m. iron and 0.001 p.p.m. copper can be determined. This method permits an increase of approximately sixteenfold in sensitivity over published methods. Results are reported for a group of commercial oils which were found to contain 0.1 to 2.50 p.p.m. iron and 0.01 to 0.02 p.p.m. copper.

TOBACCO-SEED OIL VARNISHES: A COMPARISON WITH LINSEED OIL.

M. N. Rao, C. E. McGrew, and A. J. Lewis.

Paint Tech. 16(188): 337-341. August 1951.

Tobacco-seed oil can be successfully used as a substitute for linseed oil in varnishes. These varnishes have superior durability and non-yellowing properties as compared to similar varnishes containing linseed oil.

DETERMINATION OF NITRILE-TYPE NITROGEN WITH ORDINARY KJELDAHL DIGESTION.

C. H. Van Etten and M. B. Wiele.

Analyt. Chem. 23(9): 1338-1339. September 1951.

Application of the ordinary Kjeldahl method to 16 compounds containing nitrile nitrogen demonstrated that no special reduction treatment is necessary before digestion with sulfuric acid.

RELATIONSHIP BETWEEN BRAN THICKNESS AND MILLING QUALITIES OF SOME PACIFIC NORTHWEST WHEATS.

M. A. Barmore, E. F. Seeborg, R. A. Larkin, M. M. MacMasters, M. J. Wolf, and C. E. Rist, Northwest Miller Section 2, 246(11): 1a, 3a, 4a. September 11, 1951.

Seven varieties of wheat from the Pacific Northwest were examined microscopically for thickness of bran layers, viz., outer pericarp, cross and tube cell layer, spermoderm, nucellar layer, and aleurone layer, in an effort to obtain data that might be correlated with the general milling behavior of the wheats. While there were differences in thickness of the bran layers among the seven varieties, these differences were not directly related to the general milling behavior of the wheat varieties studied. Less difference in thickness of adjacent aleurone cells was found in good-milling than in poor-milling varieties. There was no conclusive evidence, however, that this is a major factor affecting milling quality.

RECENT RESEARCH DEVELOPMENTS ON SOYBEANS AT THE NORTHERN REGIONAL RESEARCH LABORATORY.

J. C. Cowan.

Soybean Digest 11(11): 33, 34, 36, 47. September 1951.

A review of the work at the Northern Regional Research Laboratory on flavor stability of soybean oil, soy flour, soybean lecithin, and polymeric fat acids.

D-GALACTOSAN <1,4><1,6>: ITS STRUCTURE AND RESISTANCE TO PERIODATE OXIDATION.

B. H. Alexander, R. J. Dimler, and C. L. Mehlretter.

Jour. Amer. Chem. Soc. 73(10): 4658-4659. October 1951.

The periodate-resistant galactosan prepared by Hann and Hudson in 1941 has been shown, by preparation and characterization of appropriate derivatives, to be *D*-galactosan <1,4> α <1,6> instead of *D*-galactosan <1,5> β <1,3> as proposed by Hann and Hudson. This additional example of a compound having adjacent *trans* hydroxyl groups which are not attacked by periodic acid emphasizes the need for caution in the use of periodate oxidation as a tool for detecting adjacent hydroxyl groups.

DYNAMICS OF PATENT PRACTICE.

W. L. Cheesman.

Chem. and Engin. News 29(43): 4462-4465. October 22, 1951.

Patent practice changes with time and use, but many past changes have developed, unpiloted from the inventor's viewpoint. Several available methods for voluntary change are discussed, for the purpose of guidance in instituting future suggested changes. Specific methods are discussed for establishing the acceptance of applications for interference only.

INVENTIONS FOR INDUSTRY--NEW PROCESSES AND PRODUCTS FROM AGRICULTURAL SOURCES

W. L. Cheesman.

Agr. Inform. Bul. No. 40. 52 pp. (Processed.) October 1951.

Most of the Government-owned patents, patented by the Bureau of Agricultural and Industrial Chemistry through 1949, are presented bibliographically. The text is arranged under major commodity headings, and a subject index and a patent index are provided. Each patent listed is accompanied by a brief abstract.

SMALL GRAINS FOR STARCH PRODUCTION.

M. M. MacMasters and C. E. Rist.

Econ. Bot. 5(4): 338-347. October - December 1951.

Wheat, sorghum, rice, barley, oat, and rye grains are actual or potential raw materials for the industrial production of starch. They contain about 60 to 70 percent starch, and yield oil and protein as valuable byproducts of starch manufacture. Successful competition of these grains with the present major industrial sources of starch depends on a number of factors, including comparative costs of the raw materials, efficiency of processing methods, and value of the byproducts.

STUDIES ON *STREPTOMYCES GRISEOCARNEUS* AND THE PRODUCTION OF HYDROXYSTREPTOMYCIN.

R. G. Benedict, L. A. Lindenfelser, F. H. Stodola, and D. H. Traufler.

Jour. Bact. 62(4): 487-497. October 1951.

Two new strains of *Streptomyces* sp. were isolated from Japanese soil samples, and were given the name *Streptomyces griseocarneus*. The major antibiotic produced by *S. griseocarneus* could be produced on media similar to those used for streptomycin production and chemical studies on the product showed that it differed from streptomycin by having a hydroxymethyl group instead of a methyl group in the streptose portion of the molecule. Subsequent studies showed that the biological activity of hydroxystreptomycin was similar to streptomycin. Actue toxicity tests in mice by Ambrose and also by Grundy *et al.* indicate that the LD₅₀ doses of both antibiotics are similar. Hydroxystreptomycin in crude culture liquor was found to be bacteriostatic to *S. griseocarneus*, and the spores of this strain failed to initiate growth in broth containing more than 5 µg. per ml. of streptomycin or hydroxystreptomycin.

DIRECT EFFECT OF POLLEN PARENT ON PROTEIN CONTENT OF THE CORN KERNEL.

Earl R. Leng, F. R. Earle, and J. J. Curtis.

Cereal Chem. 28(6): 479-482. November 1951.

Direct effects of pollen parent on total protein content of the corn kernel were studied by pollinating silks of Illinois High Protein and Illinois Low Protein corn with two mixtures of pollen from white and yellow types of corn differing in protein content. Kernels produced on the same ear but with different pollen parents were separated by xenia effects on endosperm color. Statistically significant differences in protein content attributable to pollen source were found in three of the four 50-ear sets studied, the greatest mean difference being 0.36 percent. Although statistically significant, the differences in protein content resulting from direct effects of pollen were so small that they could be considered of no practical importance.

MICRO DETERMINATION OF THE SAPONIFICATION EQUIVALENT.

Cecil H. Van Etten.

Analyt. Chem. 23(11): 1697-1698. November 1951.

A micro method for determination of the saponification equivalent, using about 0.05 milliequivalent of ester, is described. Saponification is carried out in thin-walled, sealed, glass tubes which are crushed under alcohol solution and the excess base titrated. General applicability of the method is shown by successful analyses of 29 different esters. Accuracy and precision of the method are indicated by 12 analyses of ethyl malonate giving an average saponification equivalent showing 99.5 percent recovery of pure ester with a standard deviation of 0.8 percent.

PENTACARBANILINO-D-GLUCOSE DIETHYL MERCAPTAL.

T. A. Wolff and P. R. Watson

Jour. Amer. Chem. Soc. 75(11): 5508. November 1951.

The synthesis of pentacarbnilino-D-glucose diethyl mercaptal and its physical constants are described.

PRODUCTION OF SOLUBLE PIGMENTS BY CERTAIN STRAINS OF *STREPTOMYCES GRISEUS*.

Robert G. Benedict and Lloyd A. Lindenfelser.

Antibiotics and Chemotherapy 1(8): 512-517. November 1951.

Twenty-three strains of *Streptomyces griseus* were grown in simple synthetic media containing ammonium chloride and salts of various alpha-hydroxy and dibasic acids. A majority of the streptomycin-producing strains formed a green soluble pigment only in calcium malate medium and a yellow pigment in calcium succinate. A grisein-producing strain formed a light-pink pigment in calcium succinate and calcium malate but produced no antibiotic, whereas two grisein-like producers formed no pigments but did yield appreciable amounts of antibiotic in these same media. These findings tend to separate further those *S. griseus* strains which form grisein and unclassified antibiotics from those strains which produce streptomycin.

PSEUDOMONAS AERUGINOSA, ITS CHARACTERIZATION AND IDENTIFICATION.

William C. Haynes.

Jour. Gen. Microbiol. 5(5): 939-950. November 1951.

Pseudomonas aeruginosa is defined more precisely than in previous publications and a method is presented whereby apyocyanogenic strains can be correctly identified. This method depends upon the correlating characteristics of (1) the ability to grow at $41^{\circ} \pm 1^{\circ}$ C., (2) the ability to oxidize potassium gluconate, in shake culture, to potassium-2-ketogluconate, and (3) the faculty of producing slime in still culture, in a medium containing potassium gluconate as the principal carbon source. All strains of *Pseudomonas aeruginosa*, regardless of their pigment-forming capacity or their stage of growth, may be converted to a growth stage characterized by profuse sliminess in liquid potassium gluconate medium.

THE THERMAL EXPANSION OF WATER AND 1-PROPANOL.

Carl B. Kretschmer.

Jour. Phys. and Colloid Chem. 55(8): 1351-1355. November 1951.

An investigation of the thermal expansion of water and *n*-propanol showed no evidence of a discontinuity in the coefficient of expansion of either liquid, nor of any slow temporal change in the density of *n*-propanol, both of which types of anomalous behavior have been reported previously. The density of *n*-propanol from 0° to 75° can be represented by the equation $d_4^t = 0.819302 - 7.8824 \times 10^{-4}t + 5.925 \times 10^{-8}t^2 - 8.550 \times 10^{-9}t^3$.

ANNUAL CROP FIBERS.

S. I. Aronovsky.

Pages 47-84 of book entitled "Pulp and Paper Manufacture." Vol. 2, Preparation of Stock for Paper Making. McGraw-Hill Book Company, Inc., New York, N. Y., 1951.

A brief history of straw for papermaking is outlined. The world production and availability of straw is discussed. The physical structure and chemical constituents of straw, as well as improved present methods of procurement, storage, and preservation of this material in the United States, are described. The production of coarse straw pulp for corrugating and cheap grades of wrapping paper, and of bleached fine straw pulp for high-grade specialty papers, is discussed in detail. New processes developed in the United States and their possibilities for the pulp and paper industries of the world are described. The importance of straw as an economic raw material for pulp, paper, and board products is emphasized. A brief discussion on the utilization of sugarcane bagasse for paper and board is given. The possibilities of corn and other stalks, grasses, reeds, and bamboo are also discussed, with some emphasis on the increased consideration given bamboo for pulp and paper in the Orient.

RECENT ADVANCES IN PULPING STRAW IN THE UNITED STATES.

S. I. Aronovsky.

U.S. Dept. Agr. Bul. AIC-324. 11 pp. (Processed.) December 1951.

A brief historical resumé is given of the use of straw by the American paper and board industries up to about 1940 when definite changes in straw procurement practices and in the technology of the production of straw pulp began. The improvement of these conditions, aided by the work of the Northern Regional Research Laboratory whose program on the industrial utilization of agricultural residues was established at about the same time, is discussed. The development of the high-yield neutral sulfite process for fine straw pulps and of the mechano-chemical process for both corrugating and fine straw pulps is described. The possibilities of producing high-grade specialty papers and boards from blends of straw pulps with wood pulps are discussed in some detail. The future of straw pulp for such purposes appears bright.

THE STRUCTURE OF THE PYRONE FROM HYDROXYSTREPTOMYCIN.

Frank H. Stodola.

Jour. Amer. Chem. Soc. 73(12): 5912-5913. December 1951.

The pyrone from hydroxystreptomycin was converted by means of thionyl chloride into a chloro compound which could be reduced by zinc and acetic acid to maltol. This confirmed the structure previously assigned to the pyrone.

ACIDS OF MANY USES FROM CORN

C. L. Mehlretter. Yearbook of Agriculture, 1950-1951.

U.S. Department of Agriculture. Pp. 780-784.

The author explains how dextrose can be converted to acidic substances by oxidation with (1) microorganisms, (2) chemicals, (3) electricity, and (4) oxygen with the aid of catalysts. Processes developed over a period of years in the laboratories of the Department of Agriculture for the fermentation of dextrose to such compounds as citric, gluconic, 2-ketogluconic, 5-ketogluconic, alpha-ketoglutaric, and itaconic acids are discussed. The methods of preparation of many sugar acids and their medicinal uses are described.

CEREAL GRAINS AS FOOD AND FEED.

Kenneth R. Majors. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 331-340.

The author covers briefly the importance of corn, rice, wheat, barley, oats, rye, grain sorghums, proso, and buckwheat to the welfare of man as food and feed. Also discussed are: areas and levels of production; supply and demand; properties and characteristics; and utilization of the cereal grains.

CHEMICALS FROM STARCH AND SUGAR.

E. A. Talley and I. A. Wolff. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 136-141.

The preparation and utilization of products derived from starches and sugars as chemical raw materials are discussed. Included among the products described are starch esters, ethers, and alkoxides; starch pyrolysis and hydrogenolysis products; glycosides; sugar alcohols, and sugar acids; sugar ethers and esters; and compounds related to ascorbic acid. Numerous examples are given of the properties of these various classes of materials as they are related to specific applications.

THE CHEMIST LOOKS AT STARCH.

R. J. Dimler. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 129-135.
Brewers Digest 26(11): 49-51, 55. November 1951.

The author shows how a knowledge of starch structure and its relationship to starch properties provides a basis for developing new uses and products from starch as well as for improving present uses of starch. Most starches are made up of at least two different kinds of molecules, the straight-chain type which makes up the amylose fraction and the branched-chain type which makes up the amylopectin fraction. The structure of these molecular types is deduced from their behavior in film formation, hydrolysis by enzymes, gel formation, and other properties. Some of the more important features of starch structure are pointed out along with indications of the effect of molecular structure on the properties of starch.

THE DRUGS OF MICROBIAL ORIGIN.

Kenneth B. Raper and Robert G. Benedict. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 734-741.

The penicillin fermentation is reviewed with reference to its history and development, the techniques and microorganisms employed in this fermentation, and new uses and current production of the drug penicillin. Also considered is the penicillin fermentation in its role as incitant of the expanding search for new drugs of microbial origin. Brief statements regarding production, clinical application, toxicity, and related factors are given for streptomycin, chloromycetin, aureomycin, neomycin, bacitracin, and subtilin. The polymyxin family of antibiotics is reviewed from the standpoints of discovery, methods of production, assay, isolation, chemical characteristics, animal experimentation and clinical tests. The need for additional antibiotics is pointed out and the value of surveying large numbers of microorganisms for the discovery and subsequent production of new factors is emphasized.

THE FERMENTATION ACIDS IN INDUSTRY.

Frank H. Stodola and Richard W. Jackson. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 85-92.

The article points out that certain organic acids constitute one of the main groups of fermentation products. The fermentative production, properties, uses, and economics of citric, lactic, gluconic, and fumaric acids are discussed. Some attention is also given to acids of potential importance such as itaconic, 2-and 5-keto-gluconic, and the bionic acids. A chart is presented to show a number of organic acids which are made from glucose by various microorganisms.

FERMENTED SOY FOODS AND SAUCE.

Lewis B. Lockwood and Allan K. Smith. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 357-361.

The article describes the processes and microorganisms used by Oriental peoples in fermenting soybeans and combinations of soybeans with other materials for food uses. The foods considered are soy sauce, miso, and varieties of cheese products.

THE FLAVOR PROBLEM OF SOYBEAN OIL.

Herbert J. Dutton and John C. Cowan. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 575-578.

The flavor problem of soybean oil is projected against its economic background and the part research plays in solving certain problems connected with the use of soybean oil for food and a component of food products is discussed.

INDUSTRIAL USES FOR GRAIN SORGHUM.

J. H. Martin and M. M. MacMasters. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 349-352.

A general review is given of the established industrial uses of grain sorghum which is grown in the semiarid southwestern plains region. The success achieved by plant breeders during World War II in producing improved varieties for industrial purposes, and of industrial, state, and federal research workers in developing techniques for industrial utilization of the grain are described. The circumstances which influenced such work are discussed. A summary is given of the present status of grain sorghum in industry and of some possible future developments in the industrial use of this grain.

THE INDUSTRIAL USES OF CORN PROTEIN.

C. Bradford Croston and Cyril D. Evans. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 607-610.

A discussion of the many and varied industrial uses of corn proteins of which zein is the most important. A description of the method of production and the characterizing properties of zein is included.

MAKING USE OF THE BIOLOGICAL APPROACH.

Richard W. Jackson. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 35-40.

The discussion, emphasizing the role of biology in agricultural production and conversion of materials, focuses attention on the use of biological means for deriving new useful products from agricultural commodities. Examples are cited and some of them are explained in detail. Particular attention is paid to microbiological methods.

MOLD AGENTS IN CONVERSION OF STARCH

H. M. Tsuchiya and R. H. Blom. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 148-158.

The occurrence and some of the properties of fungal amylases are described as well as factors which affect yields of mold amylases in submerged culture. Utilization of these enzymes in the production of alcohol and sirups and for other purposes is discussed. Data are presented to show that a considerable savings in costs can be attained when fungal amylase is employed in lieu of barley malt as the converting agent in the production of alcohol from grains.

A NEW FIBER FROM CORN KERNELS.

C. Bradford Croston. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 469-471.

The many and varied industrial uses of corn proteins, of which zein is the most important, are discussed. A description of the method of production and the characterizing properties of zein is included.

OVER-ALL LOOK AT INDUSTRIAL PROTEINS.

Allan K. Smith. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 601-606.

A review is given of the industrial or non-food uses of animal and vegetable proteins, the sources of these proteins, the available supply, their important properties, and their end uses.

POLYAMIDE RESINS FROM SOYBEANS.

John C. Cowan. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 566-568.

The research and development work on the polyamide resins derived from polymeric fat acids and esters from soybean oil is reviewed.

PRODUCTION OF RIBOFLAVIN BY FERMENTATION.

Fred W. Tanner, Jr., and Virgil F. Pfeifer. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 759-763.

Riboflavin, one of the vitamins essential to man and most animals, may be produced in quantity by both chemical and fermentative processes. Commercial production of riboflavin may be realized by fermenting media composed of corn sugar and nutrients with the yeast-like organism, *Ashbya gossypii*.

RECOVERING OIL AND MEAL.

E. L. D'Aquin, E. A. Gastrock, and O. L. Brekke. Yearbook of Agriculture, 1950-1951. U.S. Department of Agriculture. Pp. 504-512.

Descriptions are given of the four methods employed for processing oilseeds in the United States. A discussion of the merits of each and of the various types of equipment used is included.

SOME INDUSTRIAL OUTLETS FOR SEED FLAX.

Howard M. Teeter. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 579-583.

The author discusses in non-technical terms the isolation, refining, and industrial utilization of linseed oil.

A SOURCE OF OUR DAILY ENERGY.

I. A. Wolff and M. M. MacMasters. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 123-124.

The importance of starch and its conversion products, such as dextrin, glucose sirup, and dextrose sugar, in the food industries is explained by numerous examples. The approximate amount of starch used annually for many specific food applications is indicated. Research on the use of starch sponge, a new form of starch, in food is described as an example of work being done to expand the food uses of starch.

STARCH IS A NUMBER OF MATERIALS.

M. M. MacMasters. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 125-128.

A survey article, introductory to several subsequent articles. Brief descriptions are given of the methods used in the United States for the production of corn, wheat, sorghum, potato, and sweetpotato starches. Some properties of these and of other starches of industrial importance in the country are discussed. Industrial uses of starch are described, and the properties which make certain starches of especial value for specific uses are pointed out.

USES OF SOYBEAN PROTEIN IN INDUSTRY.

Allan K. Smith. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 615-618.

The industrial or non-food uses of the various forms of soybean meal and isolated protein, their available supply, important properties, and uses, and competitive products are discussed.

USING RESIDUES TO CONSERVE RESOURCES

S. I. Aronovsky, L. E. Schniepp, and E. C. Lathrop. Yearbook of Agriculture, 1950-1951. U.S. Department of Agriculture. Pp. 829-842.

The present industrial markets for agricultural residue commodities are comparatively small. The destruction and wastage during the past few decades of a large part of our once abundant natural resources has focused attention on the annually renewable agricultural residues as industrial raw materials. The first and most important use for these residues is, and should be, to supply direct needs of the farm, for soil, bedding and litter. Only those residues surplus to the farm needs, and usually burned or otherwise wasted, should be considered for industrial use. The essentially fibrous residues should find expanding use in paper, container board, and building board products. The non-fibrous or very short-fibered materials may be used for mulches, soft-grit abrasives, fillers for plastics, glues and soaps, and for other miscellaneous purposes. These residues are also suitable for the manufacture of furfural, alcohol, and other chemical products.

VARNISHES AND PAINTS FROM SOYBEANS.

A. J. Lewis. Yearbook of Agriculture, 1950-1951.
U.S. Department of Agriculture. Pp. 569-574.

This is a discussion of the advance and recognition of soybean oil as a drying oil and its rapid rise for use in protective coatings. A description is given of the methods that may be followed for using soybean oil as the principal oil vehicle in house and barn paints, traffic paints, water paints, automobile and refrigerator enamels, exterior and interior varnishes, and spirit varnishes.

WET MILLING OF CEREAL GRAINS.

R. L. Zipf. Yearbook of Agriculture, 1950-1951.

U.S. Department of Agriculture. Pp. 142-147.

Almost all of the starch produced in the United States is made by the wet milling of corn. The process is discussed fully, with special attention to starch raw materials, and starch products and byproducts and their uses. Information on the following topics is presented: Corn storage and cleaning; steeping; grinding, screening, and degerminating; starch separation; starch drying; recovery of byproducts; production of dextrose and sirup; and production of modified starches, dextrans, and adhesives.

REPUBLICATIONS

A PILOT PLANT FOR SOLVENT EXTRACTION STUDIES.

AIC-195 (Rev.) June 15, 1951. [Previously published as AIC-195, July 21, 1948.]

STRAWBOARD TO REPLACE WOOD VENEER IN WIRE BOUND SHIPPING CONTAINERS.

E. C. Lathrop, T. R. Naffziger, and E. R. Stivers.

Fibre Containers XXXVI(5): 54, 59, 60, 62, 64, 66-68, 70, 71. May 1951. [Previously published in TAPPI 34(4): 145-152, April 1951, as "Boxboard from Wheat Straw to Replace Wood Veneer in Wire-Bound Shipping Containers."]

**ADD TO AIC-318

THE PIGMENTS OF *PENICILLIUM HERQUEI*.

Frank H. Stodola, Kenneth B. Raper, and Dorothy I. Fennell.

Nature 167(4254): 773. May 12, 1951.

A letter to the editor concerning a previous publication by the authors on maleic anhydride and linoleate ester reactions.

**Notice of publication received after preparation of last issue.

PATENTS

[These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased from the U. S. Patent Office, Washington, D. C.]

PRODUCTION OF FURFURAL FROM PENTOSE LIQUORS.

Charles F. Frye and Elbert C. Lathrop.
U. S. Patent 2,559,607. July 10, 1951.

Furfural is produced by converting pentose containing liquors by treatment with acids. Yields are improved by maintaining the concentration of furfural in the reaction medium below 0.7 percent. This may be accomplished by continuously removing the solution from the conversion zone, cooling the solution, and then extracting with a furfural solvent. After extraction, the solution is recycled to the conversion.

PREPARATION OF D-TARTARIC ACID.

Lewis B. Lockwood and George E. N. Nelson.
U. S. Patent 2,559,650. July 10, 1951.

D-tartaric acid is produced by fermentation of a soluble salt of 5-keto-d-gluconic with *Pseudomonas fluorescens*. The fermentation is conducted under submerged aerobic conditions for a period of 3 to 17 days, and the tartaric acid is recovered as potassium hydrogen tartrate.

PREPARATION OF D-GLUCURONIC ACID.

Charles L. Mehlretter.
U. S. Patent 2,559,652. July 10, 1951.

D-glucuronic acid is made by treating a solution of calcium 1,2-acetone-D-glucuronate hydrate with oxalic acid and heating the resulting solution above 75° C. for 1 to 3 hours. The precipitated calcium oxalate is removed by filtration. D-glucuronic acid is recovered from the filtrate.

REVERSIBLE VEGETABLE GEL.

Arthur C. Beckel and Paul A. Belter.
U. S. Patent 2,561,333. July 24, 1951.

A novel vegetable gel is made by mixing alcohol with a proteinaceous soybean fraction dispersed in water. Sufficient alcohol is added to result in a solution containing 30 to 50 percent alcohol by volume. This solution, after heating to a temperature between 75° C. and boiling, forms a reversible gel when cooled to 30° C. or lower. The reversible gel finds use as a food material. The proteinaceous fraction used as a starting material is obtained by extracting an alcohol-extracted soybean residue with water.

METHOD FOR PRODUCING VITAMIN B₁₂

Harlow H. Hall and Henry M. Tsuchiya.
U. S. Patent 2,561,364. July 24, 1951.

Vitamin B₁₂ is produced by cultivating *Flavobacterium devorans* in a medium containing an assimilable carbon source such as dextrose or crude molasses and an assimilable nitrogen source such as corn-steep liquor or soy meal. The product may be recovered as a vitamin concentrate by evaporating the culture liquor after fermentation is complete.

N-BETA-PROPIONIC ACID DERIVATIVES OF ALPHA-AMINO ACIDS.

Leonard L. McKinney, Eugene H. Uhing, Eugene A. Setzkorn and John C. Cowan.
U. S. Patent 2,562,198. July 31, 1951.

Beta cyanoethyl derivatives of amino acids, produced by the reaction of alpha amino acid salts with acrylonitrile, are hydrolyzed by acids or alkalies (alkali hydrolysis preferred) to form the N-beta-propionic acid derivatives. The products are white, crystalline solids useful as organic intermediates.

PROCESS FOR MAKING D-GLUCURONIC ACID AND ITS SALTS.

Charles L. Mehlretter.
U. S. Patent 2,562,200. July 31, 1951.

Alpha-methyl-D-glucoside is catalytically oxidized with an oxygen-containing gas to form alpha-methyl-D-glucuronoside. The glucuronoside is then hydrolyzed with acid, neutralized, and treated with aniline to precipitate aniline N-D-glucuronoside salt. The salt is then hydrolyzed to give the D-glucuronic acid.

STARCH CARBAMATES.

Ivan A. Wolff.
U. S. Patent 2,562,978. August 7, 1951.

Starch is reacted with an organic isocyanate, under substantially anhydrous conditions, in an organic solvent to produce a starch carbamate containing at least one carbamyl group for every 14 anhydroglucose units. The product is non-swelling or non-paste forming in hot water.

DRYING WET WHEAT GLUTEN.

Justin M. Tuomy and Richard L. Slotter.
U. S. Patent 2,567,980. September 18, 1951.

Wet wheat gluten, as produced by the batter process, and having a moisture content of 65-70 percent, is slurried with ethanol by agitation, and the slurry is dried upon a heated surface. The drying is conducted by allowing the slurry to remain for about 10 seconds or less in contact with a surface heated to 150° - 170° C.

POLYMYXIN PRODUCTION.

Robert G. Benedict.
U. S. Patent 2,571,104. October 16, 1951.

The antibiotic, polymyxin, is produced by cultivating *B. polymyxa* under submerged aerobic conditions in a medium containing 1 to 2 percent carbon source (glucose) and a source of assimilable nitrogen (peanut flour). The medium is supplemented during the course of the fermentation by adding .5 to 2 percent carbon source. The ultra-violet mutant, *B. polymyxa* NRRL B-719 (u.v. -37), gives high yields of the antibiotic.

DERIVATIVES OF PARAHYDROXYPENICILLIN G.

Frank H. Stodola, Jacques L. Wachtel and Robert D. Coghill.
U. S. Patent 2,573,741. November 6, 1951.

Halogen derivatives of parahydroxyphenicillin G are claimed.

PHOSPHATES OF AMYLACEOUS POLYSACCHARIDES.

Rolland L. Lohmar, Jr.

U. S. Patent 2,575,352. November 20, 1951.

Phosphorylated starch, insoluble in aqueous media, either neutral or within weakly acidic or weakly basic ranges, is prepared by phosphorylation of starch with a phosphorous oxyhalide in a pyridine medium. The starch is activated by pretreatment in pyridine. When granular starch is used, the phosphorylated product retains its granule form.

BIOLOGICAL PRODUCTION OF RIBOFLAVIN.

Thomas G. Pridham.

U. S. Patent 2,578,738. December 18, 1951.

Riboflavin is produced by culturing *Ashbya gossypii* in a carbohydrate (glucose)-assimilable nitrogen medium by the general method of U. S. Patent No. 2,445,128. The yield is increased by adding an increment of the carbohydrate during the course of the fermentation. The time of addition is during minimum pH after riboflavin synthesis has begun and the carbohydrate has fallen to 0.10 to 0.20 percent of the medium.

